

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of) **BOX AF**
Makoto YAMADA et al) **Group Art Unit: 1714**
Application No.: 09/409,338) **Examiner: C. Shosho**
Filed: September 30, 1999)
For: **JET PRINTING INK AND INK-JET**)
RECORDING METHOD)

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SUBMISSION OF EXECUTED DECLARATION PURSUANT TO 37 C.F.R. §1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:


Further to the Amendment filed on January 28, 2002, attached is the executed Declaration Pursuant to Rule 132 referred in the Amendment.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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Date: January 31, 2002

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DECLARATION PURSUANT TO RULE 132

Honorable Commissioner of Patents and Trademarks
Washington, D.C.

I, Makoto Yamada, one of the above-named applicants,
declare and state that:

I hereby submit experimental results obtained by ex-
periments, which were recently performed by me.

In Comparison Example 21, I prepared a jet-printing
aqueous ink using poly(vinylpyridine) and glycerol in the
same manner as in Example 44 of Nigam et al. In Examples
21 to 24 and Comparison Example 22, I prepared jet-printing
aqueous inks in the same manner as in Comparison Example 21,
except that 1-imidazolyl polymer (Examples 21 to 24) or 2-
imidazolyl polymer (Comparison Example 22) was used in pla-
ce of poly(vinylpyridine). In Comparison Examples 23 to 28,
I prepared jet-printing aqueous inks in the same manner as
in Comparison Example 21, Example 21 to 24 and Comparison
Example 22 respectively, except that glycerol was not used.

The prepared aqueous inks were evaluated in the same
manner as in Examples 1 to 12 given in our specification on
pages 35 to 39. The results are set forth in Table 3.

Comparison Example 21

In 40 ml of water, 5 g of CarboSet1594 was dissolved. In the solution, 4 g Duasyn Direct Black was further dissolved. Separately, 1.5 g of poly(vinylpyridine) was dissolved in 20 ml of water. The solutions were mixed and stirred. To the resulting mixture, N-methylpyrrolidone (5 wt.%) and glycerol (2 wt.%) were added. The resultant liquid was filtered under pressure through a micro-filter (average pore size: 0.8 μ m, diameter: 47 mm) to prepare a jet-printing aqueous ink.

Using the prepared ink, an image was printed on a photo paper sheet (super photo grade ink-jet paper, Fuji Photo Film Co., Ltd.) and a Genuine paper sheet (MJA4S3P, Seiko-Epson Co., Ltd.), by means of an ink-jet printer (PM-700C, Seiko-Epson Co., Ltd.).

Each printed image was evaluated from the viewpoints of hue and resistance against light.

In consideration of the fact that an absorption having a sharp peak gives a clear hue, the image was subjected to measurement for reflection spectrum using a spectrophotometer and evaluated by the following criteria: A (half width: less than 80 nm)

B (half width: 80 to 100 nm)

C (broad).

The resistance against light was estimated in the following manner. The sample image was exposed to xenon light (85,000 Lux) by means of a weather meter (Atlas C, 165) for 3 days, and then the image density was measured by means of a reflection densitometer (X-Rite 310TR) for estimating a residual amount of the dye. The dye residual amount was classified by the following criteria:

A (residual amount: more than 80%)

B (residual amount: 60% to 80%)

C (residual amount: less than 60%).

The results are set forth in Table 3.

Example 21

The procedure for preparing an aqueous ink described in Comparison Example 21 was repeated except that 1.5 g of poly(1-vinylimidazole) was used in place of 1.5 g of poly(vinylpyridine), to prepare a jet-printing ink. Poly(1-vinylimidazole) corresponds to the basic polymer (A-4) given in our specification on page 10 and the polymer A shown at column 9, line 65 to column 10, line 5 of Bates et al. (U.S. 5,958,999).

The prepared aqueous ink was evaluated in the same manner as in Comparison Example 21. The results are set forth in Table 3.

Example 22

The procedure for preparing an aqueous ink described in Comparison Example 21 was repeated except that 1.5 g of 1-vinylimidazole/N-vinylpyrrolidone copolymer (molar ratio: 70/30) was used in place of 1.5 g of poly(vinylpyridine), to prepare a jet-printing ink. 1-Vinylimidazole/N-vinylpyrrolidone copolymer corresponds to the basic polymer (A-23) given in our specification on page 11, and is analogous to the polymer E shown at column 10, lines 29 to 36 of Bates et al. (U.S. 5,958,999).

The prepared aqueous ink was evaluated in the same manner as in Comparison Example 21. The results are set forth in Table 3.

Example 23

The procedure for preparing an aqueous ink described in Comparison Example 21 was repeated except that 1.5 g of styrene/1-vinylimidazole/1-vinyl-3-benzylimidazolium chloride terpolymer (molar ratio: 50/35/15) was used in place of 1.5 g of poly(vinylpyridine), to prepare a jet-printing ink. Styrene/1-vinylimidazole/1-vinyl-3-benzylimidazolium chloride terpolymer corresponds to the basic polymer (A-24) given in our specification on page 11.

The prepared aqueous ink was evaluated in the same manner as in Comparison Example 21. The results are set forth in Table 3.

Example 24

The procedure for preparing an aqueous ink described in Comparison Example 21 was repeated except that 1.5 g of N-vinylpyrrolidone/1-vinylimidazole/acrylamide terpolymer (molar ratio: 30/30/1) was used in place of 1.5 g of poly(vinylpyridine), to prepare a jet-printing ink. N-vinylpyrrolidone/1-vinylimidazole/acrylamide terpolymer corresponds to the terpolymer used in Example 37 (at column 30, lines 25 to 36) of Nigam et al. (U.S. 5,973,025).

The prepared aqueous ink was evaluated in the same manner as in Comparison Example 21. The results are set forth in Table 3.

Comparison Example 22

The procedure for preparing an aqueous ink described in Comparison Example 21 was repeated except that 1.5 g of 2-vinylimidazolium chloride/N-vinylpyrrolidone copolymer (molar ratio: 95/5) was used in place of 1.5 g of poly(vinylpyridine), to prepare a jet-printing ink. 2-Vinylimidazolium chloride/N-vinylpyrrolidone copolymer corresponds to LUVIQUAT FC 905 copolymer used in Example I (at column 11, lines 19 to 40) and described at column 8, lines 7 to 9 of Schwarz, Jr. (U.S. 5,990,198).

The prepared aqueous ink was evaluated in the same manner as in Comparison Example 21. The results are set forth in Table 3.

Comparison Examples 24 to 28

The procedure for preparing an aqueous ink described in Comparison Example 21, Example 21 to 24 or Comparison Example 22 was repeated except that glycerol was not used, to prepare a jet-printing ink.

The prepared aqueous ink was evaluated in the same manner as in Comparison Example 21. The results are set forth in Table 3.

TABLE 3

Ink	Glycerol	Polymer	<u>Photo paper</u>		<u>Genuine paper</u>	
			Hue	Resistance	Hue	Resistance
Comp.21	+	X-1	C	C	C	C
Ex. 21	+	A-4	A	A	A	B
Ex. 22	+	A-23	A	A	A	B
Ex. 23	+	A-24	A	A	A	B
Ex. 24	+	A-25	A	A	A	B
Comp.22	+	X-2	A	B	A	C
Comp.23	-	X-1	C	C	C	C
Comp.24	-	A-4	B	B	B	C
Comp.25	-	A-23	B	B	B	C
Comp.26	-	A-24	B	B	B	C
Comp.27	-	A-25	B	B	B	C
Comp.28	-	X-2	B	C	B	C

(Remark)

Glycerol: Added (+) or not (-)

X-1: Poly(vinylpyridine)

A-4: Poly(1-vinylimidazole)

A-23: 1-Vinylimidazole/N-vinylpyrrolidone copolymer
(molar ratio: 70/30)

A-24: Styrene/1-vinylimidazole/1-vinyl-3-benzylimidazolium chloride terpolymer (molar ratio: 50/35/15)

A-25: N-vinylpyrrolidone/1-vinylimidazole/acrylamide terpolymer (molar ratio: 30/30/1)

X-2: 2-Vinylimidazolium chloride/N-vinylpyrrolidone
copolymer (molar ratio: 95/5)

As is clear from the results given in Table 3, the jet-printing ink according to the present invention gives an image of good hue and high resistance to light in various receiving sheets. Further, no adverse effect on the ejection of the inks of Examples 21 to 24 from the nozzle was observed.

The undersigned declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date January 23, 2002

Makoto Yamada

MAKOTO YAMADA